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21 APRIL 2004

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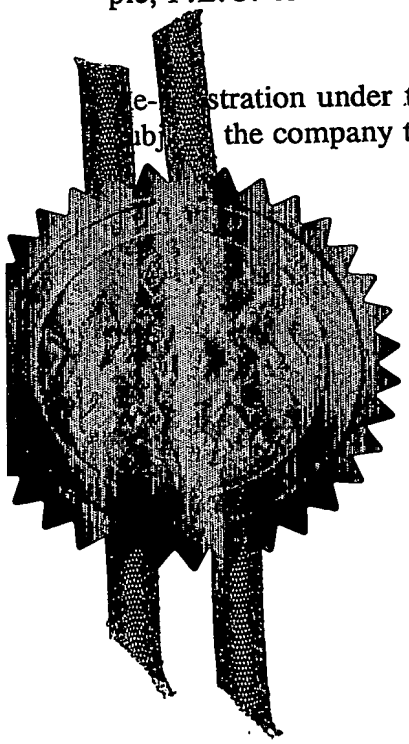

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Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

1. Your reference

KWN/AAH/C591.00/U

2. Patent application number
(The Patent Office will fill in this part)

0308475.3

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

United Wire Limited
Granton Park Avenue
Granton
Edinburgh
EH5 1HT
United Kingdom

Patents ADP number *(if you know it)*

If the applicant is a corporate body, give the country/state of its incorporation

Scotland 5146931002

4. Title of the invention

Filtering Screen

5. Name of your agent *(if you have one)*

Keith W Nash & Co

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

90-92 Regent Street
Cambridge
CB2 1DP
United Kingdom

Patents ADP number *(if you know it)*

0001206001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
c) any named applicant is a corporate body.
See note (d))

Yes

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Continuation sheets of this form	
Description	5
Claim(s)	
Abstract	
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Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	
Request for preliminary examination and search *(Patents Form 9/77)*	
Request for substantive examination *(Patents Form 10/77)*	
Any other documents *(please specify)*	

11. I/We request the grant of a patent on the basis of this application.

Signature KeithWNashCo Date 11/4/03

Keith W Nash & Co

12. Name and daytime telephone number of person to contact in the United Kingdom: Alistair Hindle - 01223 355477

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C591.00/U

Title: Filtering Screen

Field of the Invention

This invention concerns screens such as are fitted to vibrating screening machines, sometimes used as shale shakers to separate solids from fluids. Such machines are of particular application in the oil well drilling industry to separate drilling mud from base fluid after recovery from down-hole during drilling.

Background

It is important that mesh used as filter media for oilfield screens is robust. Some filter media incorporating rectangular mesh are more robust than traditional square mesh. For example, such filter media are disclosed in US 5,944,197 and our own Patent Application PCT/GB2002/005018.

Although rectangular meshes have proven successful as a robust, high capacity alternative to square mesh, there is still a desire within the industry to use wire cloth with square openings, and the use of square mesh as the filter media for oilfield screens is still widespread.

Traditionally square mesh is comprised of identical numbers of warp and weft wires per unit area, and a common wire diameter. For example, a 200# market grade cloth has 200 warp wires per inch and 200 weft wires per inch. Both warp and weft wires are 0.050 mm in diameter.

It has been discovered that there are two different situations in the field, where screen cloth will break almost exclusively in one direction only (warp or weft). The two scenarios are described below:

(1) Fatigue failure in composite screens

Composite screens comprise layers of mesh bonded to a generally flat support structure (normally referred to as a frame) containing a number of generally rectangular openings across which the screen mesh is tensioned. The mesh is supported by the frame and the openings in the frame create the rectangular mesh panels for filtering the fluid materials.

In operation the maximum stress on the wire cloth, in such a panel is found to occur at the middle of the longer side. This means that the wires running parallel to the shorter sides of the openings are subject to greater stress than those running parallel to the longer sides of the opening. Areas of greater stress are shown in Figure 1.

It has been observed in the field that the wires running along the shorter span tend to fail first, thus confirming the theory that these wires are subject to greater stress.

(2) Premature failure from over-tensioning on hook-strip screens

Hook-strip style screens consist of generally rectangular sheets of wire cloth (mesh) with hooks along two parallel sides. The sheets are inserted into, and attached by the hooks to a stretching mechanism in the shaker. This stretches the mesh to tension the wire cloth. This is necessary to encourage good solids conveyance across the stretched mesh in use.

In practice hook-strip screens are usually stretched over a radius so as to present a convex upper surface as shown in Figure 2. Two edges of mesh sheet do not include hooks and are not secured to the shaker. Therefore the tensioning load is applied in one direction only. This means that if the screen is over-tensioned the wires parallel to the tensioning direction, will fail prematurely.

Summary of the Invention

According to the present invention there is provided a screen for use in a vibrating machine for separating solids from liquid material (especially solids from drilling mud recovered during oil well drilling), the screen comprising woven wire cloth of orthogonal wires tensioned and secured to a support structure defining at least one rectangular opening across which the cloth extends, wherein the apertures in the cloth have an aspect ratio between 0.8:1 and 1:1.25, and wherein the wires which extend across the width of the (or each) rectangular opening have a larger cross-section than the wires which extend across the length of the (or each) rectangular opening

Preferably, the number of longer cross section wires per unit length is less than the number of the orthogonal smaller cross section wires per unit length, in each case secured in a direction at right angles to the run of the wires.

Preferably, the longer wires have a cross-sectional area of between 10% and 30% greater than the smaller wires. More preferably, the longer wires have a cross-sectional area in the range 20% to 25% greater than the smaller wires. Typically, the larger wires have a cross-sectional area 22% greater than that of the smaller wires.

The wires are typically of circular cross-section. In one example, the diameter of the larger wires is 0.046mm, and the diameter of the smaller wires is 0.036mm. Typically, there are 200 larger wires per inch and 230 smaller wires per inch. In another example, the diameter of the wires is as before, but there are 212 larger wires per inch and 230 smaller wires per inch resulting in square apertures. Accordingly, the apertures in the cloth preferably have an aspect ratio of between 0.9:1 and 1:1.1. In general, the apertures are rectangular in shape and may have an aspect ratio of between 0.8:1 to 0.99:1 or 1:1.01 to 1:1.25. In certain embodiments, the wires may be selected and arranged so that the apertures are square.

In one preferred embodiment the cloth is bonded to a rectangular support structure defining a plurality rectangular openings, wherein the longer cross section wires are parallel to the width (ie shorter sides) of the rectangular openings.

In another embodiment the wire cloth is rectangular and is provided with a plurality of hooks along two opposite parallel edges thereof, the two edges being selected as those which are parallel to the smaller cross section wires, and the hooks are used to retain the wire cloth in a shaker machine.

Brief Description of the Figures

Figure 1 is a plan view of a prior art square mesh filter screen; and

Figure 2 is a plan view of a prior art hook-strip screen stretched over a radius.

Detailed description of an embodiment of the invention

A standard 230 mesh screen cloth has the following features:

Standard 230#

warp count	230 per inch
warp diameter	0.036 mm
weft count	230 per inch
weft diameter	0.036 mm

Nominal Aperture size – 0.074 x 0.074 mm

A screen mesh has been manufactured in accordance with the invention, which has larger warp wires than weft wires.

The modified cloth has the following features:

Modified 230#

warp count	200 per inch
warp diameter	0.046 mm
weft count	230 per inch
weft diameter	0.036 mm

Nominal Aperture size – 0.081 x 0.074 mm

The wires of the modified 230# mesh cloths provide a slightly elongated wire aperture (having a 1:1.1 aspect ratio). This does not compromise the cut point significantly. The overall nominal cut point would be 76.3 rather than 74 (by the equivalent sphere method).

The conductance of the modified mesh is probably decreased from 1.17kD/mm to 1.07kD/mm. However this is offset by the fact that the warp wires have 22% greater cross-sectional area, which significantly prolongs the life of the screen.

Alternative embodiment

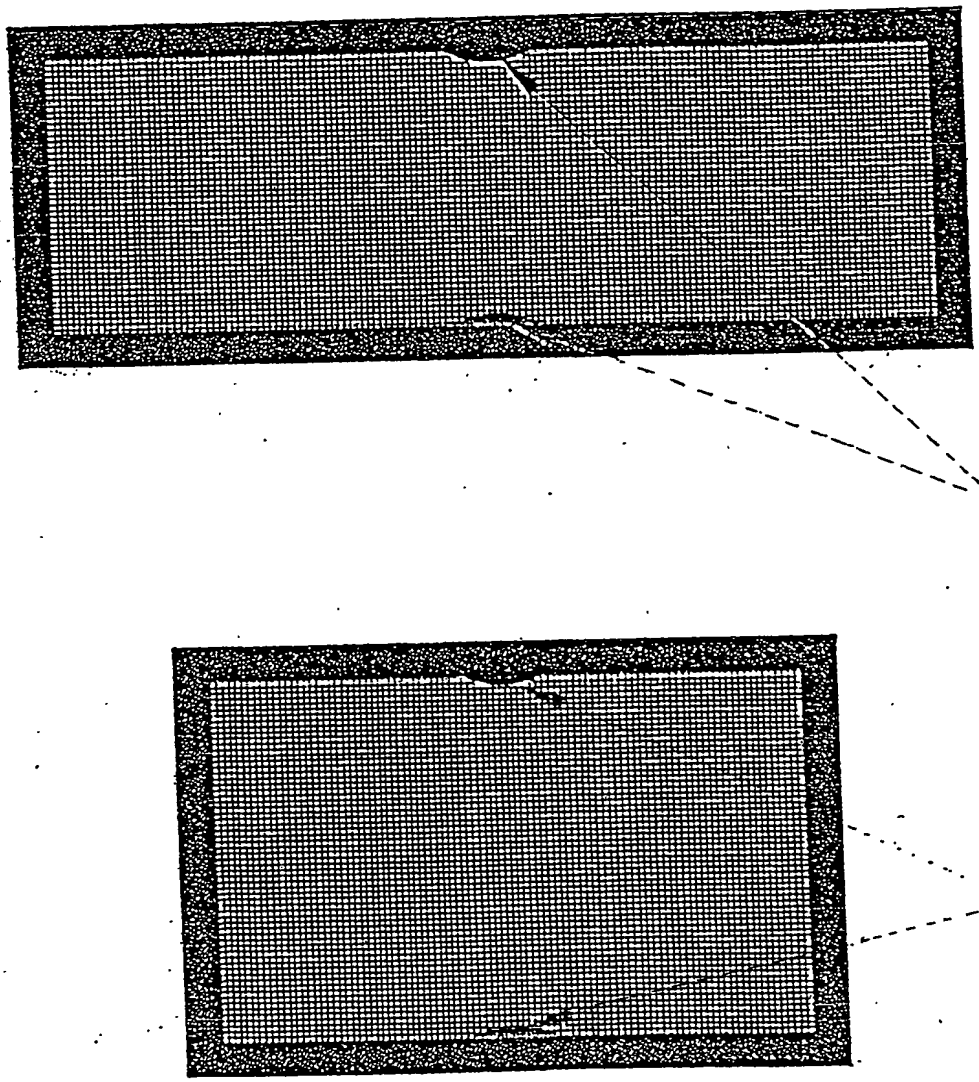
An alternative modified 230# mesh cloth has the following attributes:

warp count	212 per inch
warp diameter	0.046 mm
weft count	230 per inch
weft diameter	0.036 mm

Nominal Aperture size – 0.074 x 0.074 mm

Thus, the wire apertures are square.

Figure 1



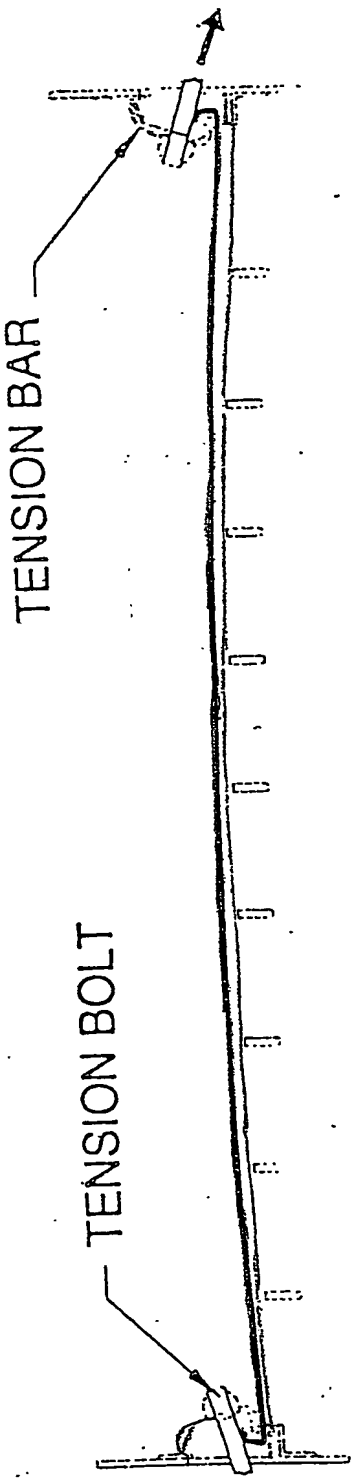


Figure 2

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